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24998	7590	10/11/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			PRUCHNIC, STANLEY J	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	
			2859	

DATE MAILED: 10/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/816,945

Applicant(s)

PRIMDAHL ET AL.

Examiner

Stanley J. Pruchnic, Jr.

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7 and 9-12 is/are rejected.
- 7) ☒ Claim(s) 4 and 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some    c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Drawings*

1. The drawings were received on 14 July 2005. The Examiner approves these drawings.

### *Claim Objections*

2. Claims 1 and 12 are FINALLY objected to because of the following informalities:

In Claim 1, beginning in Line 6, the "endothermic catalyzing steam reforming reaction" lacks antecedent basis. The previous mention of that type of reaction was not positively claimed, but was only descriptive of a property of the catalytic material.

Similarly, in Claim 12, beginning in Line 7, the "endothermic catalyzing steam reforming reaction" lacks antecedent basis. The previous mention of that type of reaction was not positively claimed, but was only descriptive of a property of the catalytic material.

Moreover, Claims 1 and 12 are objected to as being incomplete for omitting essential structural and/or functional cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections and/or functional relationships. The omitted cooperative relationships are: any cooperative relationships between the "endothermic catalyzing steam reforming reaction" and the "process stream". It appears that Applicant intends that they are related, but this has not been clearly indicated.

See MPEP § 2172.01 wherein the following is stated: ">But see *Ex parte Nolden*, 149 USPQ 378, 380 (Bd. Pat. App. 1965) ("[I]t is not essential to a patentable combination that there be interdependency between the elements of the claimed device or that all the elements operate concurrently toward the desired result"); *Ex parte Huber*, 148 USPQ 447, 448-49 (Bd. Pat. App. 1965) (A claim does not necessarily fail to comply with 35 U.S.C. 112, second paragraph where the various elements do not function simultaneously, are not directly functionally related, do not directly intercooperate, and/or serve independent purposes.).<"

Appropriate correction is required.

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 1-7 and 9-12 have been considered but are moot in view of the new ground(s) of rejection. However, Applicant's arguments will be addressed as applied to the amended claims.

4. Applicant's arguments filed 14 July 2005 have been fully considered but they are not persuasive as applied to the amended Claims, e.g., with respect to the rejection of Claims 1, 3, 10 and 12 being rejected under 35 U.S.C. 102(b) as being anticipated by US 6333011 B1 (Schliephake; Volker *et al.*, **SCHLIEPHAKE**).

5. Applicant's general argument, beginning "At the outset", on Page 8, to summarize, is that the claims require a thermowell provided with a catalyst that is active in an endothermic steam reforming reaction to achieve cooling of the thermowell [Examiner's emphasis]. The Examiner has considered that the thermowell of **SCHLIEPHAKE** that is, in normal use, placed in contact with a catalytic material in an endothermic reaction, will necessarily and inherently be cooled by the reaction; and any thermowell that is formed of a material that serves to catalyze the same reaction would also be cooled by an endothermic reaction in the same manner. The purpose of cooling the thermowell is met in the art, inherently, if the art teaches the use of a thermowell in a vessel wherein the endothermic reaction takes place.

6. Applicant's specific argument against **SCHLIEPHAKE**, i.e., that thermowell 18 is not covered by a layer of catalytic material is not persuasive. The thermotubes (Col. 3, Lines 4-8) are equipped with temperature measuring units, and so each of these has been considered a thermowell. Since they are in a catalyst bed, filled with catalyst particles, the temperature measuring units are considered to be in contact with catalyst on their outer surfaces, therefore "covered" by a layer of a catalytic material. **SCHLIEPHAKE** does not explicitly describe the particular type of endothermic reaction, but (in Col. 3, Lines 27-58) describes the type of reactions not being restricted, but they may be endothermic or exothermic reactions, not limited to oxidation reactions.

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Moreover, Applicant has described the thermowell of **SCHLIEPHAKE** as "in a fixed catalyst bed, which covers the thermowell as long as the catalyst is fixed around the thermowell (in REMARKS, filed 14 July 2005, page 13, last paragraph).

7. Applicant's arguments, see REMARKS, filed 14 July 2005, with respect to the rejection of Claims 1, 3 and 10 under 35 U.S.C. 102(b) as being anticipated by US 3,913,058 A (**NISHIO et al.**, hereinafter **NISHIO**) have been fully considered and are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (*i.e.*, that the process stream is related to an endothermic catalyzing steam reforming reaction, considered to mean that an endothermic catalyzing steam reforming reaction is at least a portion of the process stream) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claims 1 and 3, for example, only require the catalytic material to be "active in at least one endothermic catalyzing steam reforming reaction"; and Claim 1 further requires "contacting the thermowell with a process stream during the endothermic catalyzing steam reforming reaction, to carry out the measurement", but there is no positive recitation of any "endothermic catalyzing steam reforming reaction" in the claims. Therefore the process stream is not considered to be limited to include an "endothermic catalyzing steam reforming reaction".

Moreover, although **NISHIO** discloses the catalyst material is active in an exothermic reaction, this does not exclude the same catalyst material from being active in an endothermic reaction as claimed by Applicant. Although **NISHIO** does not explicitly disclose the catalyst-coating material (*i.e.*, platinum) of the thermocouple arranged in a thermowell as being active in at least one endothermic catalyzing steam reforming reaction, platinum has been considered to inherently be a catalyst active in at least one endothermic catalyzing steam reforming reaction. In support of this assertion, Previously cited prior art, US 5143647 A (Say; Geoffrey R. *et al.*, **SAY**), teaches that conventional steam-reforming catalysts can be described as being from the group including, among others, Group VIII noble and non-noble metals, preferred catalyst metals being Group VIII metals. Platinum, being a Group VIII noble metal, as is well known in the art, is a member of the group of preferred conventional steam-reforming catalysts, as taught by **SAY**. Thus, **SAY** is evidence that the platinum coating of **NISHIO** is inherently "active in at least one endothermic catalyzing steam reforming reaction" as claimed by Applicant.

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8. Applicant's arguments, see REMARKS, filed 14 July 2005, with respect to the rejection of Claims 5-9 under 35 U.S.C. 103(a) as being unpatentable over **SCHLIEPHAKE** in view of US 5143647 A (Say; Geoffrey R. *et al.*, **SAY**) have been fully considered and are persuasive as applied to Claim 6, since the thermowell of **SCHLIEPHAKE** is in the catalyst bed, it cannot be used to measure the temperature upstream of the catalyst bed as claimed, since it would no longer be covered by a layer of a catalytic material. Moreover, **SCHLIEPHAKE** does not disclose or fairly suggest the process stream undergoes the steam reforming reaction in a catalytic bed as claimed by Applicant in Claim 5, or that the process stream has a temperature of 1000-1500 degrees C as claimed by Applicant in Claim 9. Therefore, the rejection of claims 5-9 has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of previously cited prior art. See *infra*.

9. Applicant's arguments, see REMARKS, filed 14 July 2005, with respect to the rejection of Claims 4 and 9 under 35 U.S.C. 103(a) as being unpatentable over **SCHLIEPHAKE** in view of US 5005986 A (Najjar; Mitri S. *et al.*, hereinafter **NAJJAR**) have been fully considered and are persuasive as applied to Claim 4. Since the thermowell of **SCHLIEPHAKE** is in the catalyst bed, Examiner agrees that it cannot be modified to function as claimed by Applicant, to measure the temperature behind an inner surface of the reactor wall, which would be outside of the process volume in the reactor of **NAJJAR**. If it were moved to a location behind an inner surface of the reactor wall in the reactor of **NAJJAR**, then the thermowell would no longer necessarily be covered by a layer of a catalytic material of the catalyst bed as claimed by Applicant. Therefore, the rejection of Claim 4 has been withdrawn.

### ***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1, 3 and 10 are **FINALLY** rejected under 35 U.S.C. 102(b) as being anticipated by US 3,913,058 A (**NISHIO et al.**, hereinafter **NISHIO**).

Regarding **Claims 1 and 10**: **NISHIO** discloses a method and instrument for measurement of high temperatures of a process stream (e.g., in the exhaust pipe of a gasoline engine; Fig. 4; see Col. 4, Lines 65-67; and Cols. 5-6) comprising a thermocouple 1 (Col. 3, Lines 51-67; Figs. 1 and 5) inserted and arranged in a thermowell 7 (Col. 4, Lines 5-10), the thermowell being at least partly covered by a layer (Col. 4, Lines 65-67) of a catalytic material (platinum layer 13; Col. 5, Lines 30-41), the catalytic material being active in at least one endothermic catalyzing steam reforming reaction as claimed by Applicant.

Although **NISHIO** does not explicitly disclose the catalyst-coating material (i.e., platinum) of the thermocouple arranged in a thermowell as being active in at least one endothermic catalyzing steam reforming reaction, **SAY** (US 5143647) teaches that conventional steam-reforming catalysts can be described as being from the group including, among others, Group VIII noble and non-noble metals, preferred catalyst metals being Group VIII metals. Therefore, platinum, being from the group of preferred conventional steam-reforming catalysts, as taught by **SAY**, is inherently "active in at least one endothermic catalyzing steam reforming reaction" as claimed by Applicant.

Further regarding **Claim 3**, the thermowell is installed in a reactor, where a chemical reaction occurs, e.g. at "A" in Fig. 4., inserted in the pipe hole, installed with the threads as shown in the Figs.

### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art

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are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 2 and 11 are **FINALLY** rejected under 35 U.S.C. 103(a) as being unpatentable over **NISHIO**.

**NISHIO**, to summarize, discloses all the limitations as claimed by Applicant in Claims 2 and 11, as described above in Paragraph 11 as applied to Claims 1, 3, and 10. **NISHIO**, as described above, does not disclose the thermowell is covered by a layer thickness of 0.2-5 mm or 0.5-2 mm as claimed by Applicant in Claims 2 and 11.

With respect to said tip of the thermowell covered with a particular catalytic layer thickness: the limitations in these claims, absent any criticality, are only considered to be the "optimum" layer thickness of the layer disclosed by **NISHIO**, as stated above, that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, *etc.* See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the layer thickness of **NISHIO** to provide a minimal thickness required to catalyze the reaction while not so thick that the layer would cause the response time of the temperature sensor to be too long in order to be able to function to measure temperature as taught by **NISHIO**.



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15. Claims 1, 3, 5, 7, 9, 10 and 12 are **FINALLY** rejected under 35 U.S.C. 103(a) as being unpatentable over US 6333011 B1 (Schliephake; Volker *et al.*, hereinafter **SCHLIEPHAKE**) in view of US 6277894 B1 (Agee; Kenneth L. *et al.*, hereinafter **AGEE**).

**SCHLIEPHAKE** discloses a method and instrument for measurement of high temperatures of a process stream as claimed by Applicant in Claims 1, 3, 10 and 12, the instrument comprising

a thermocouple 14 inserted (and arranged; Col. 5, Lines 1-17) in a thermowell 18 ("protection sleeve 18"), the thermowell 18 being at least partly covered by a layer of a catalytic material (Col. 1, Lines 12-47), the catalytic material being active in at least one endothermic reaction (Col. 3, Lines 27-38) as claimed by Applicant. The cooling of the thermowell by contacting the thermowell with a process stream during endothermic catalyzing steam reforming reaction is not explicitly shown by **SCHLIEPHAKE**.

**SCHLIEPHAKE** does not disclose the particular catalyzing steam reforming reaction and contacting the thermowell with a process stream during an endothermic steam reforming reaction as claimed by Applicant in each of Claims 1, 10 and 12.

Further regarding **Claim 3**, the thermowell is installed in a reactor (tubular reactor R), having been inserted axially in the center of the bed (Col. 7, Lines 20-55), considering the top of the tube R will have a wall in order to enclose the tubular reactor.

**AGEE** discloses it is known in the art to produce syngas from natural gas using the two step autothermal reforming process (Paragraph [0010]) by using a separate partial oxidation burner, followed by a catalyst bed with a feed of the required gases, in a secondary unit.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute a two chamber process for the single reactor of **SCHLIEPHAKE** in order to form syngas as taught by **AGEE**. Since the catalytic bed of **SCHLIEPHAKE** would be used for the endothermic autothermal reforming process, the thermowell would be cooled because it is embedded in the catalyst bed as already taught by **SCHLIEPHAKE**.

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With respect to said process stream temperature as claimed in Claim 9: the limitations in this claim, absent any criticality, are only considered to be the "optimum" temperature of the process disclosed by **SCHLIEPHAKE**, as modified by **AGEE**, as stated above, that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, *etc.* See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize temperature of the process stream to that required to catalyze the reaction in order to be able to function to form syngas as taught by **AGEE**.

### ***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in a form PTO-892 and not mentioned above disclose related temperature measurement devices and methods related to processing gas streams.

- US 5595719 A (Ul-Haque; Israr *et al.*) disclosed determining the steam reforming activity of the catalysts [in] a stainless steel reactor tube of 8 mm inner diameter was used. The reactor was placed in an electric furnace. Inside the reactor tube a thermocouple was positioned at the bottom of the catalyst bed. The thermocouple was attached to a furnace controller and to a digital temperature indicator;
- US 20010055560 A1 (Schiodt, Niels C. *et al.*) disclosed a reactor including a catalyst wherein the temperature was controlled externally and monitored by a thermocouple on the reactor outside the center of the catalyst bed;
- US 5232517 A (Hilborn; Howard L. *et al.*) discloses thermocouple guide tubes in a catalytic reaction vessel;
- US 5192132 A (Pelensky; Martha T.) discloses a thermowell for a fixed-bed reactor which has a vertical spine portion, and multiple spider portions spaced along the spine portion. The thermowell is constructed in the reactor while loading the catalyst, adding catalyst to cover the spider portion;
- US 2383729 A (LOY JOHN W) discloses a catalyst chamber apparatus having a thermocouple in the catalyst bed;

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- US 6277894 B1 (Agee; Kenneth L. *et al.*) discloses Nickel is commonly used as a catalyst in the endothermic reforming reactions; synthesis gas subsystem 16 is preferably a steam reformer; Fig. 3, subsystem 190 includes an autothermal reformer (ATR) reactor 194 which contains an appropriate catalyst, e.g., Nickel;
- US 20020085967 A1 (Yokota, Koji) disclosed that platinum is a steam reforming catalyst preferred when using fuel including CO (Paragraph [0060]), as well as Pd, Rh and Ru noble metals;
- US 20030172590 A1 (Bhattacharyya, Alakananda *et al.*) discloses a reforming process including Nickel catalyst bed, and discloses other catalyst materials including platinum; and
- US 5429809 A (Stahl; Henrik O. *et al.*) teaches inlet temperature of an ATR may be above 1000 degrees C; outlet temperatures may be up to 950 degrees C.

**Newly cited prior art:**

- US 4822570 A (LERMAN *et al.*) discloses a thermal sensing apparatus (including a thermowell) in a bottom outlet nozzle of a reactor vessel;
- US 4311671 A (NOTMAN) discloses each catalyst bed 12A, 12B, 12C is equipped with a thermocouple port 33A, 33B, 33C (Fig. 4);
- US 5242226 A (ROSS) discloses a temperature-measuring instrument especially for measuring high temperatures in pressure reactors. It comprises a sheathed thermocouple, the sheath covered by an outer ceramic tube 4 in order to protect the thermocouple (thermowell assembly) from damage in a high temperature reaction zone. There is no additional catalytic coating over the (non-catalytic) ceramic coating;
- US 6599011 B2 (DAILY *et al.*) discloses thermowells inside a reaction chamber, wherein sheath 22 may be Inconel or stainless steel -- DAILY discloses no additional catalytic coating over the (presumably non-catalytic) coating;
- DE 3613501 A (DONNERHACK, S) discloses a coating material selected to reduce the catalytic effects of a noble metal thermowell or sheath; and
- the cited articles relate to catalyzing steam reforming reactions.

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

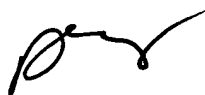
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanley J. Pruchnic, Jr., whose telephone number is **(571) 272-2248**. The examiner can normally be reached on weekdays (Monday through Friday), the best hours being from 8:30 AM to 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez (Art Unit 2859) can be reached at **(571) 272-2245**. The Central FAX Number for all official USPTO communications is **571-273-8300**.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the official USPTO website at <http://www.uspto.gov/> or you may call the **USPTO Call Center** at **800-786-9199** or 703-308-4357. The Technology Center 2800 Customer Service FAX phone number is (703) 872-9317.

The cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site ([www.uspto.gov](http://www.uspto.gov)), from the Office of Public Records and from commercial sources.

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10/5/05